

ACTIVITY 8 GRADES 6-12

Objective

Students will observe the development of a common insect through all of its life stages and compare it to the life cycle of *Galerucella* beetles and other common insects. Fruit flies and mealworms can be used because their life cycles are similar to that of *Galerucella* beetles.

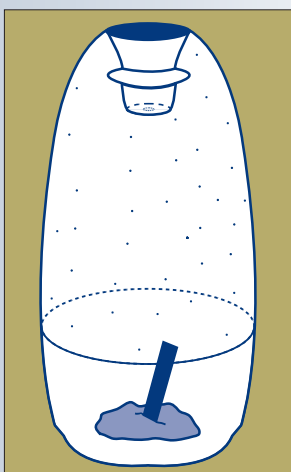
Time Suggestion

Approx. 20 minutes per week, but will vary depending upon rate of insect development.

Wisconsin Model Environmental Education and Science Standards

Environmental Education: A.8.4, A.8.5, B.12.4, B.8.12.

Science: C.8.1, C.8.2, C.8.4, C.8.3, F.8.1, F.8.2, F.8.5, F.8.6, F.8.7, A.12.6, B.12.5.



GROWING UP IN A JAR*

DESCRIPTION

In order to understand the needs of *Galerucella* beetles used to control purple loosestrife, it is necessary for students to become acquainted with its life cycle and development. Fruit flies and mealworms provide model populations that have a shorter life cycle and are often easier for students to study. They may also be used later in studying the concepts of exponential growth and limiting factors.

Students will trap adult fruit flies (*Drosophila* sp.) and describe the development from egg to adult, comparing it to that of beetles. In doing so, they will learn standard methods of handling fruit flies and may develop a colony for later study of population growth. Students can also raise mealworms (*Tenebrio* sp., available from many pet shops and easily grown in bran meal) to compare the life cycle with that of *Galerucella* beetles.

PROBLEM

What are the developmental stages and growth requirements of an insect?

MATERIALS

Per small group:

- ☐ 2 or 3 baby food jars, wide-mouthed glass vials, or 2-liter plastic bottles
- ☐ cotton batting
- ☐ cheese cloth
- ☐ hand lens or stereoscope
- ☐ small piece of ripe banana

PREPARATION

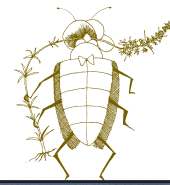
Fruit flies can be purchased from a biological supply company during winter months.

Show students insects, either by bringing some in, taking the class to an outdoor lab, or showing them pictures or a film.

PROCEDURES

1. If you use a 2-liter bottle, students will cut the tapered portion of the bottle off at the bottom of the taper, leaving the cap on. Punch a 5-mm hole in the cap. Place ripened fruit mass in the bottom of the bottle (bananas work well). Insert a small strip of index card or heavy paper into the banana for adults to rest on and pupae to attach to. Invert the cut top and glue or tape it into place in the top of the straight portion of the bottle to form a trap. Punch pin holes on the sides.





ACTIVITY 8 GROWING UP IN A JAR (CONTINUED)

2. Have students label their insect traps with their names and the date. Place bottles outside in a shaded location for 1 to 2 days, or until adult fruit flies are seen inside.
3. Stop the opening with a cotton ball wrapped in cheesecloth and place in a warm, shaded location of the classroom.
4. Approximately every other day, allow students time to observe the development of eggs and larvae using a hand lens or stereoscope. These may be removed for study with a cotton swab or wooden splint. Students should make careful drawings of all stages observed, and include written descriptions of changes and behavior.
5. When adults appear, some may be transferred into another trap and inactivated for study by placing the trap in an ice bath until chilled to inactivity. As time progresses, present pictures of the life cycles of other insects, including *Galerucella* beetles. Proper terminology should be taught at this time.

Hold a discussion of students' individual observations that were made during the lab.

BACKGROUND INFORMATION

Part of successfully rearing *Galerucella* beetles for controlling purple loosestrife is recognizing the insect's life stages, of which there are four—typical of a metamorphic insect. You will also need to know the growth requirements of each stage in order to grow your beetle population successfully. With good conditions, a little luck, and 6-8 weeks, you can release up to 100 new beetles for every one you start with!

Studying fruit fly or mealworm life cycles will familiarize you with the growth forms of insects and prepare you for what you will see working with *Galerucella* beetles. This should make you more successful in rearing the beetles. When you are done rearing these organisms, the populations of flies and meal worms may be useful in other studies, such as population growth or genetics, while releasing the *Galerucella* beetles will, of course, help solve a serious threat to our wetlands: invasion by an aggressive, exotic plant.

STUDENT ASSESSMENT

The following factors may be taken into account in evaluating student progress:

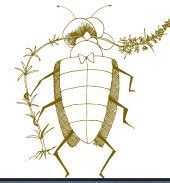
- Accuracy of lab book drawings and quality of records of observations.
- Technique, involvement, cooperation, and interaction with group members.
- Terminology of insect development.
- Quality of presentation, if one is assigned.

EXTENSIONS

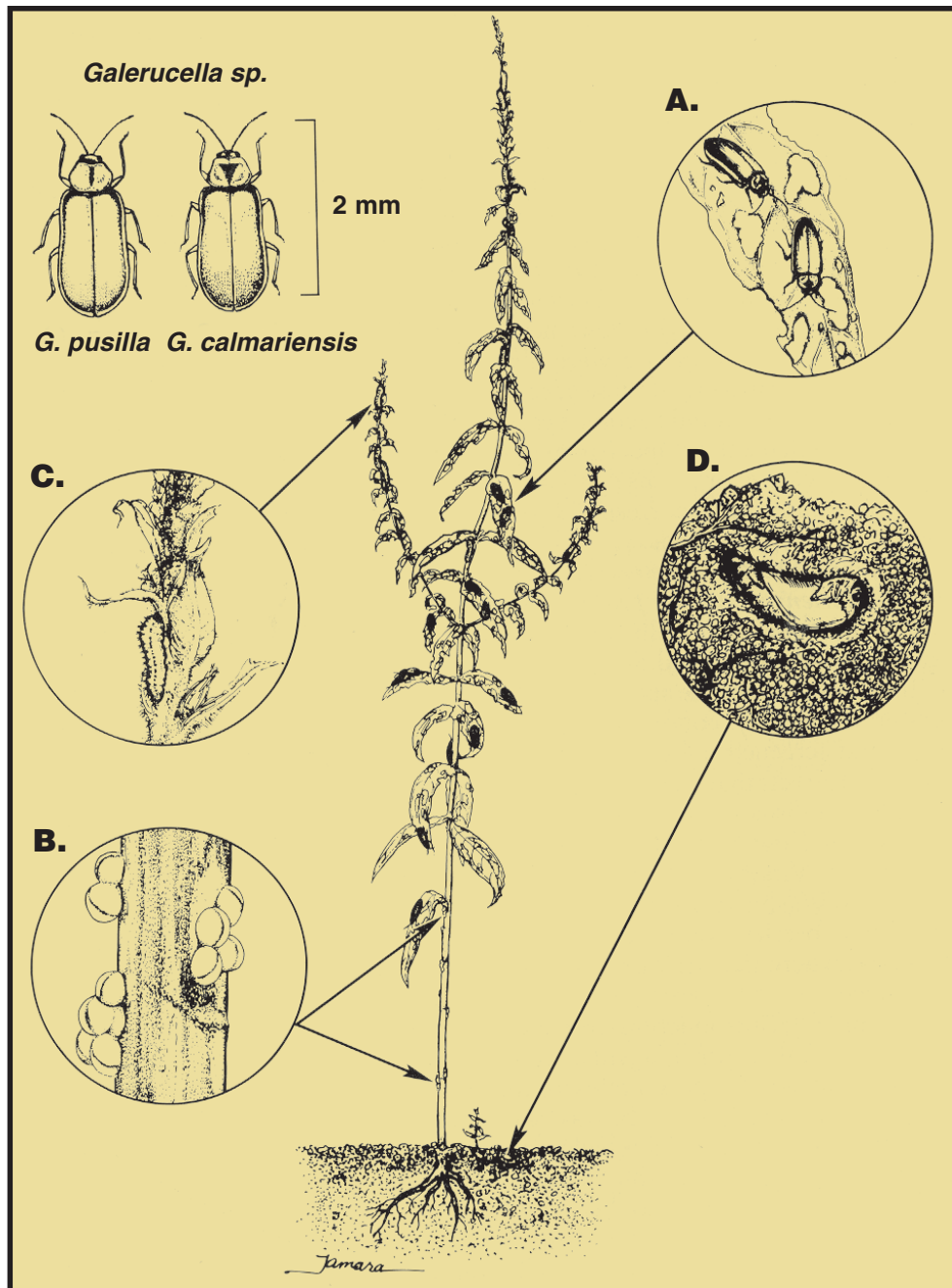
Explore your schools' surroundings for eggs of other insects, collect them and follow these insects through their life cycles. Compare and contrast them with those of fruit flies, mealworms and *Galerucella* beetles. Be sure to use suitable containers with vent holes and appropriate habitat materials. Two-liter bottles often work great. Identify and collect enough plant or animal food for the insect to complete its life cycle. Remove rotten food and release adults produced.

Have students find information about the life cycle of *Galerucella* beetles either on the Internet or in a library.

* Revised with permission from "An Insect Life Cycle" in *The Purple Loosestrife Project Cooperator's Handbook*.



ACTIVITY 8 GROWING UP IN A JAR (CONTINUED)



Life cycle of *Galerucella californiensis* and *G. pusilla*. **A.** Old adults emerge in spring from soil, feed on new leaves, and mate. **B.** Spring oviposition lasts approximately one month; batches of two to ten eggs are laid daily on the plant stem and leaves. Old adults die after laying eggs. **C.** Developing larvae feed on bud, leaf and stem tissue. **D.** Pupation to new adults occurs in the soil or litter near the host plant. New adults feed briefly, over-winter in soil, and emerge in spring as old adults.